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A REVIEW

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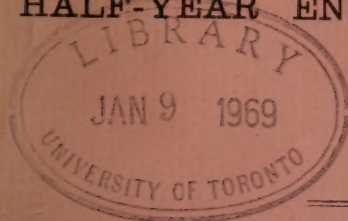
MINING OPERATIONS

IN THE

STATE OF SOUTH AUSTRALIA

DURING THE

HALF-YEAR ENDED DECEMBER 31st, 1914.



No. 21

DO NOT REMOVE
FROM THIS ROOM

Compiled by LIONEL C. E. GEE, S.M., Chief Registrar and Recorder, Department of Mines.

ISSUED UNDER THE AUTHORITY OF THE

HONORABLE SIR RICHARD BUTLER, M.P.,

Minister of Mines,

By F. C. WARD, J.P., *Secretary for Mines.*

DEPARTMENT OF GEOLOGICAL SCIENCES,
UNIVERSITY OF TORONTO
Adelaide.

R. E. E. ROGERS, GOVERNMENT PRINTER, NORTH TERRACE.

1915.

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Miners' Rights and Privileges thereunder.

A miner's right is obtainable at the Department of Mines, Adelaide, also at the issuing stations in the various mining districts, at a cost of 5s.

A miner's right is in force for one year from the date of issue, and may be renewed at any time during its currency for another term of one year on payment of 5s.

The holder of a miner's right is authorised to prospect on any mineral lands for any metal, mineral, coal, or oil, and to peg out (of the prescribed shape and dimensions) gold, mineral, coal, and oil claims, and also leases of a like nature.

AREAS AND WORKING CONDITIONS.

GOLD LEASES—Maximum area, 20 acres; working conditions, one man to every five acres.

MINERAL LEASES—40 acres; one man to every 10 acres.

MISCELLANEOUS LEASES—

Salt 640 acres; special conditions.

Gypsum 640 “ “

Mining Works..... 10 “ one man.

COAL OR OIL LEASES 640 “ one man to every 40 acres.

GOLD DREDGING LEASES 200 “ special conditions.

MINERAL CLAIMS 40 “

GOLD CLAIMS..... 30ft. x 30ft., alluvial; 100ft. x 600ft., reef.

Gold claims must be constantly worked—one man for each claim—and mineral claimholders must employ two men for each claim. Amalgamation of either gold or mineral claims reduces the labor conditions by one-half.

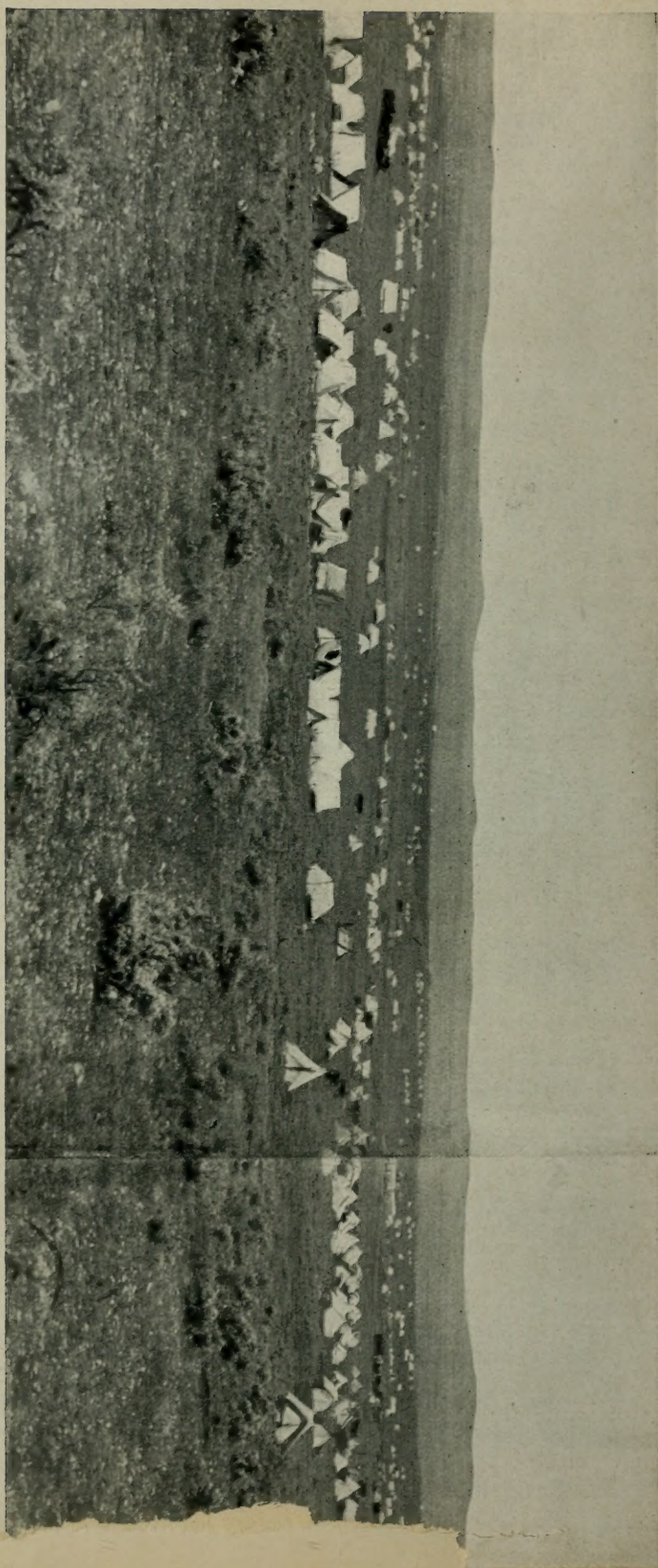
Gold, mineral, coal, and oil leases are granted for a term of 42 years—the two former at a rental of 1s. per acre per annum and a royalty of 6d. in the pound on net profits, the latter at a rental of 6d. per acre per annum until coal or oil is found in payable quantities, when 1s. per acre is payable and a royalty of 6d. in the pound on the net profits.

The Minister may permit, for the concentration of labor, of the amalgamation of not more than four adjoining gold or mineral leases.

Any number of gold, mineral, coal, or oil leases may be held by one person.

Licences to search for twelve months for precious stones, mineral phosphates, oil, rare metals, minerals, and earths are issued on specific mineral lands, not exceeding five square miles in area for one person, a fee of 20s. being charged for each square mile or portion thereof. These licences give a preferential right to a lease over a portion of the area, as prescribed.

To face p. 2.]





To face p. 2.]

Teetulpa Diggings. December, 1886.

Vide page 29.



Teetulpa Diggings. December, 1886.

Fide page 29.

PREFACE.

THE war has, of course, disarranged all mining matters more or less. No quotations for Standard Copper were received for the months of August, September, and October; the average for December was £56 18s. 5d. per ton, and since then prices have risen to over £60.

More attention is now being paid to the search for gold in the State, and it is to be hoped that one result of the war will be that some of the long hoped for discoveries will be made.

Dr. Arthur Wade, who has been engaged by the Government to report on the oil possibilities of the State, commenced his examination of the country at the end of September.

LIONEL C. E. GEE,

Chief Registrar of Mines.

February 24th, 1915.

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Mining Operations during the Half-year ended December 31st, 1914.

AREA AT PRESENT HELD UNDER MINING ACTS (DECEMBER 31st, 1914).

Nature of Holding.	Number.	Area.
Mineral leases	309	14,222 acres
Gold leases	85	1,579 "
Gold dredging leases	—	— "
Miscellaneous leases	64	15,952 "
Coal and oil leases	—	— "
Mineral claims	356	13,911 "
Occupation licences	206	163 "
Search licences	286	748,800 "
Coal and oil claims	18	11,320 "
Gold claims	1	2 "
Total holdings	1,325	805,889 acres

REGISTERED FROM JULY 1st, 1914, TO DECEMBER 31st, 1914.

Mineral leases	9	317 acres
Gold leases	30	545 "
Gold dredging leases	—	— "
Miscellaneous leases	—	— "
Coal and oil leases	—	— "
Mineral claims	100	3,877 "
Coal and oil claims	2	1,280 "
Gold claims	—	— "
Occupation licences	25	12½ "
Search licences	192	520,960 "
Miners' rights	643	—
Total	1,001	526,991½ acres

MEN EMPLOYED.

Estimated number of men employed in mining and mineral works, December 31st, 1914 :—

Copper	3,000
Gold	375
Salt	375
Silver-lead	25
Other minerals	330
Smelting works, Port Pirie	1,500
Raising flux in connection therewith	150
Total	5,755

GENERAL NOTES.

At first it was feared that, in consequence of the war, the Wallaroo and Moonta Mines would have to suspend operations. This would have had far-reaching and disastrous results, and the Government promptly proffered assistance. The directors, however, finally decided not to avail themselves of this offer. A general reduction of 20 per cent. was made in the wages of all employés, and full-handed work was carried on. The tributers at the Yelta and the Hamley were thus enabled to market their ores, and, owing to the more satisfactory state of the copper market of late, the company has recently been able to remit 10 per cent. of the reduction.

The war, which so seriously deranged the copper market for a time, and has so far hampered the introduction of capital for general mining speculation, seems, however, to have stimulated the search for gold. Two private prospecting parties have been sent out to the N.W. More attention is being turned to Tarcoola and in the N.E., in addition to the revival, previously noted, at Wadnaminga—which proceeds steadily and satisfactorily—small companies have been formed to rework the Lux and Queen Bee Mines near Olary, and the Golden Junction and the Dustholes at Mount Grainger. Also, it may be noted that many of our mineral productions such as iron ore, salt, gypsum, &c., having their markets within the Commonwealth and New Zealand, have not been affected as yet.

Four small prospecting parties have been sent out by the Government—three to the N.E. and one in the S. So far, no discoveries of economic value have been made by them.

No quotations for standard copper were received for the months of August, September, and October. The average for the remaining three months is £56 16s. 10d. per ton, and the average for nine months of 1914 is £60 8s. 1d.

Pernatty Mines.—Development here has proceeded on the lines laid down by Mr. W. E. Wainwright in his report, which was published in the last Review, No. 20, and the results are considered very satisfactory, particularly as regards the bed of red quartzite lying below the leaching sands, which has opened up remarkably well wherever sunk upon, and it is considered that the estimate of the tonnage of ore available can now be largely increased. A trial leaching plant has been erected, and experimental sampling is in hand.

At *Yudnamutana* Mr. D. D. Rosewarne is in charge. He has been engaged in a general examination and sampling of the mines, and the erection of a crushing and leaching plant.

At the *Mount Gunson Mine* matters are as previously reported. Some claims S. of Mount Gunson, on the W. side of Pernatty Lagoon, have been taken up for *Manganese*, and returns show 50 tons of 50 per cent. ore raised.

At the *Mount Lyell Consols, Wallaroo (Bingo)*, a complete Cornish pumping plant and an engine have been delivered during the half-year. No work has been done since the war started.

Reports by Inspector Jones on the following mines will be found as under :—

Olivaster, silver-lead, page 30.

Robertstown-Bright, silver-lead, page 31.

Edelweiss, copper and vanadium, page 31.

St. Elmo, copper, page 31.

West Burra, copper, page 33.

Utica, copper, page 33.

Hamley, copper, page 34.

Cowell Silver Find, silver-lead, page 34.

Calcookra, copper, page 35.

No ore has been treated at the *Kitticoola, Reedy Creek, Mine*. The work in progress consists of sinking the main shaft and driving levels.

Some work has been done at the *Wilgena Enterprise, Earea Dam*. Another reef has been found, and ore is being raised from it for treatment at the Glenloth Government plant.

The returns from the Tarcoola Government battery and cyanide works, *vide* page 13, show some very good results.

A report concerning mining matters in the N.E. will be found at page 27.

At the *Deloraine Gold Mine* steady progress has been made with developmental work. Sinking of main shaft advanced a further 45ft., making total depth 285ft. The inflow of water is now very heavy, and the reef has pinched in the bottom of the shaft. At the 192ft. level the S. drive has been extended 124ft. 6in., making the total distance from the shaft 279ft. The reef extends along the whole length, but in the last 50ft. is reduced in size and value. Additional stopes opened out in the S. drive at this level have kept the battery working full time during the half-year, crushing 1,150 tons for 481ozs. bullion and 42 tons concentrates, containing 259ozs. gold and 1.67 tons copper. A large additional Cornish boiler has been installed in the mine.

From the *Mount Malvern Silver-lead Mine* 100 tons of lode material have been raised; $7\frac{1}{4}$ tons of ore marketed yielded 58 per cent. lead and 20·7ozs. of silver to the ton. The work done has been exploratory and developmental, and consists of driving levels at 214ft. and sinking a winze, also at 306ft., 60ft. below water level. The prospects of the mine are considered very good.

The *Olivaster Silver-lead Mine*, near Rapid Bay, vide report by Inspector Jones, page 30, is situated in a well-known silver-bearing district; it is reported to be opening remarkably well, and sanguine expectations have been formed about its future. So far only $9\frac{1}{2}$ tons of ore have been treated realising 51 per cent. lead and 9½ozs. silver per ton.

A find of silver-lead ore has been made near *Duck Pond Hill*. High assays were obtained from specimens, and a small syndicate was formed at Quorn for working the place.

At *Radium Hill* 400 tons of ore have been treated, producing 40 tons of concentrates. Alterations have been made in the mills, and development work done in the mine.

Radium Extraction Company of South Australia, Mount Painter.—At the 100ft. level in the main shaft, No. 6 workings, 26ft. of driving was carried out in the E. crosscut, but no payable ore met with. An open cut started on the W. side of the main ore channel, at 10ft. below the brace, and extended E. for 15ft., with width of 14ft., met several veins of high-grade ore, and won over 6 tons of concentrating material. Work was suspended in August.

One hundred and eighty-nine search licences for oil, comprising an area of 517,760 acres, have been issued during the half-year.

Boring for oil on Eyre Peninsula has been discontinued for the present. Two bores are in progress in the South-East—one near Kingston (Mr. Whaley and partners), and the other near Robe (the S.A. Oil Wells Co.).

An illustration is given showing the Tarcoola mail coach crossing, Lake Hart. This is probably the largest workable salt lake in Australia. Two samples taken when passing over the lake, one in November, 1912, gave 98·40 per cent. sodium chloride, and the other, November, 1914, 96·18 per cent. sodium chloride.

The Government Geologist contributes the following notes:—

Consequent upon the war the mineral industry has been affected to a marked degree in the case of certain products. The demand for some crude mineral products has increased to an enormous extent. In the case of others the market has temporarily collapsed; but searching inquiries are being made throughout the British Dominions for sources of these crude minerals, which have hitherto been worked up into finished products by the metallurgists of foreign countries. The object of these investigations is the establishment of British metallurgical works to treat the minerals for which the only market has hitherto been in alien hands.



Mail Coach on Lake Hart.



Geologist's Well, Tarcoola.

To face p. 8.]

With regard to some minerals inquiries have already been made from the Department of Mines, and it is thought wise to give publicity to the demands—actual and potential—that have arisen or that may arise. It is hoped that some brief statement of these demands may serve as a stimulus to prospecting, and the following notes have been written for the information of those who are engaged in the development of the mineral resources of South Australia.

Potash.

The only known mineral deposits in South Australia which can at the present time be regarded as tangible sources of potash are those in which the mineral alunite occurs. A report on one occurrence of this mineral is contained in Review No. 19 of Mining Operations in the State of South Australia, pages 39-42, wherein a description is given of the deposits at Carrickalinga Head. A report on a more recent discovery near Warnertown is included in this Review, *vide* page 25.

Beyond these two occurrences of which we have definite knowledge it should be remembered that there are possibilities which are worthy of careful consideration. In the first place an examination of the saline deposits of the great basins of internal drainage scattered through the central portions of the State appears to be justified. The knowledge we possess of these saline deposits is fragmentary, and is almost wholly restricted to the information gleaned from the working of the superficial portions of these basins for salt. Little boring appears to have been carried out, and very little detailed analytical work has been done to ascertain the chemical composition of the deposits. This absence of detailed investigation should be borne in mind, in order that unjustifiable conclusions should not be prematurely formulated.

The only Government boring which has been carried out on the site of any salt lake is that made during 1890, at Tocchi's Lagoon (Tubbs' Lagoon), in the hundred of Melville, Yorke Peninsula. This locality is not one at which it would be reasonable to expect any concentration of potassium. This bore penetrated 30ft. of dark-colored clay, containing gypsum, before entering a great thickness of boulder clay. The last 11in. of the bore, of which the total depth is 305ft. 5in., were drilled in very hard, blue rock. There is no record of any chemical examination having been made of the samples obtained from the first 30ft. of the bore.

As far as is known there is a marked similarity between the deposits which occur in districts of variable geological structure, and in a large number of cases it seems that the source of the saline matter is the so-called "cyclic salt" washed out of the atmosphere by the rain. It remains to be proved whether the salt-filled depressions of the interior derive their mineral contents from the same source as the coastal lagoons and claypans which experience periodical evaporation. But there are certain definitely-known facts which point to the necessity for the examination of the more centrally-situated basins.

It is now known that there are certain basins in South Australia which receive the drainage from areas in which potash-bearing rocks are abundantly developed. The physiographical features and the geological structure being considered, it would appear that some basins are more favorably situated than others. Lake Gairdner should be selected as the first area to be tested by boring in search of possible concentrations of potash salts, and the site of the first bores should be preferably at the S. end of the lake. This site is selected for the reasons that the S. and W. walls of the lake are composed of felspar porphyry and granites. If successful results are obtained from the prospecting of this locality, it would be well to extend the investigation to the sites of Lake Gilles and Lake MacFarlane. The more northerly salt lakes—Island Lagoon, Pernatty Lagoon, and Lake Hart—are more remote from the known outcrops of potash-bearing rocks than those here suggested

for investigation. A sample of salt from Lake Hart (presumably from the superficial crust) has recently been analysed for the Geological Survey, and found to contain only 0.39 per cent. of potash.

The only other South Australian salt lake that receives the drainage from a region in which potash-bearing rocks are abundantly developed is Lake Frome.

There is also to be considered the possibility of the supply of potash salts to Lake Eyre, by the drainage from the zone of mound springs marginal to the Great Australian Artesian Water Basin. The water contained in this artesian basin is known to carry varying proportions of potassium salts at different points. Any search for possible concentrations of the potassium compounds from these sources should be commenced in Lake Eyre South.

There are in South Australia no known igneous rocks with an appreciable potash content other than the felspar porphyries, granites, and pegmatites of the Pre-Cambrian terrain.

It has been proved by the actual analysis of three specimens of the felspar porphyry of the Gawler Ranges that the potash content varies from 5.12 per cent. to 5.70 per cent., and has an average value of 5.5 per cent. Nine specimens of granite from the Eyre's Peninsula region have been analysed, and proved to contain from 3.23 per cent. (in the case of the Thompson's Well granite, near Yantanaby), to 6.06 per cent. (in the case of the Charleston massif) of potash. The average content of potash in these nine samples is 5.09 per cent.

The only potash-bearing mineral which is known to be fairly widely distributed, and which has not been taken into consideration in the preceding note, is glauconite. The Tertiary series of the Murray River Basin is known to contain beds of glauconitic sand and clay, and similar deposits have been recognised beneath the Nullarbor Plains and near Aldinga.

No complete analyses of these glauconite-bearing rocks have been made, and their content of potash is consequently unknown. Any investigations on these rocks should include a search for phosphoric acid, since the association of calcium phosphate with glauconite is world-wide.

Monazite.

The mineral monazite contains a small and variable percentage of thorium, from which is produced the thorium nitrate used in the manufacture of the incandescent mantles for gas burners.

The mineral is known to occur at a number of widely-separated localities in South Australia, although no deposits have yet been worked on a commercial basis. The factors which determine the availability of a deposit are not merely size and accessibility, for the thorium content must be over 3 per cent. before the mineral can find a market.

The recorded occurrences in this State are those at Mount Painter; King's Bluff, near Olary; the hundred of Para Wirra; and Daw's Diggings, on the Eleanor River, Kangaroo Island.

At Mount Painter the monazite is found as a constituent of the lodes containing radio-active minerals, and also in the mica schist into which the pegmatitic dykes have intruded. The quantity of the mineral present in this district is probably large, but the only analysis that has been made shows a thorium content of only $1\frac{1}{2}$ per cent.

At King's Bluff the monazite occurs in association with auriferous quartz. No analysis has been made with the object of proving its thorium content, and the quantity of monazite present is not known to be appreciable.

There are likewise no available data with regard to the quality and extent of the Para Wirra deposits, which are restricted to the creeks in the neighborhood of Kersbrook and Chain-of-Ponds.

At Daw's Diggings, on Kangaroo Island, different samples have been obtained, assays of which indicate a variability of the thorium content.

In addition to the occurrences mentioned above, the existence of which has been officially confirmed, it has been reported that monazite has been found near Paralana (on the E. side of the Flinders Range, near Mount Painter); in the vicinity of Earea Dam (30 miles E.S.E. of Tarcoola); and on the W. coast of Eyre's Peninsula. In all these places the geological features are such that the occurrence of monazite may be expected.

Very small quantities have yet been obtained from any of the deposits in the State, but it is possible that further prospecting may reveal the existence of larger quantities than have hitherto been obtained.

Magnesite.

An inquiry for magnesite has reached the Department of Mines from an American source. The interruption of trade from Styria is said to have resulted in a desire on the part of American buyers to secure Australian deposits suitable for exploitation on a large scale.

Magnesite is known to occur in various parts of this State, though little systematic work has yet been carried out with the object of proving the quality and extent of the deposits beneath the outcrops.

The occurrence which, according to information now in our possession, is the most important one in South Australia is that situated at a distance of a little more than 5 miles from Tumby Bay. A report on this deposit is included in Review No. 20, pp. 30-33. A specimen from section 1A, in the hundred of Yadnarie, about 9 miles N.W. of Cleve, has recently been analysed at the School of Mines, and found to contain 98.91 per cent. of magnesium carbonate. No details with regard to this occurrence are available. The Broken Hill Proprietary Company is working a deposit in section 184, hundred of Howe, near the Beetaloo Waterworks.

Magnesite has also been recorded from a number of places which are tabulated in the Record of Mines, on page 371.

Molybdenite.

The value of molybdenite has reached an extraordinary height, and there is an eager demand for all of this mineral that can be produced. A small quantity has been produced from South Australian mines in the Moonta district, but the total output has been small.

While the Yelta Mine was being worked by the State the quantity of molybdenite recovered by hand picking up to August, 1913, was 6cwts. 2qrs. 9lbs. This amount was won during the dressing of 16,552 tons of crude ore, from which 8,033 tons of dressed ore were prepared for smelting. A small quantity has been won since that date by the party of tributaries working the Yelta Mine.

A specimen of gneiss, containing disseminated molybdenite in minute flakes, and obtained near Benowie, has been brought to the office of the Geological Survey. Reports have been received of the occurrence of this mineral in the vicinity of Earea Dam, and at Commonwealth Hill, north of Tarcoola. These reported occurrences have not been officially confirmed.

DEPARTMENT OF MINES.

“THE NATIVE INDUSTRIES ENCOURAGEMENT ACT, 1872.”

Notice of the Offer of a Bonus for the Discovery of Oil.

Adelaide, January 19th, 1914.

A bonus of £5,000 is offered to the person or body corporate which first obtains from a bore or well situated in the State of South Australia 100,000galls. of crude petroleum, containing not less than 90 per cent. of products obtainable by distillation.

No application for a bonus will be considered unless the following conditions have been strictly complied with :—

1. The applicant for the bonus must have furnished to the Minister of Mines, during the progress of drilling operations—

- (a) A monthly record of work done ;
- (b) A full log of all bores and wells sunk, whether successful or unsuccessful ;
- (c) Samples of materials passed through by the bores, to be taken at every 50ft. sunk, and also at every change of country encountered ;
- (d) A declaration pursuant to “The Statutory Declarations Act, 1835,” of the exact locality of each bore or well. (This should be furnished with the first monthly report on the bore or well).

2. The oil must have been stored at the bore or well from which it has been obtained until the whole 100,000galls. has accumulated.

3. The applicant must furnish with his application—

- (a) The certificate of a licensed surveyor nominated by the Minister of Mines as to the quantity of oil so stored ;
- (b) The certificate of the Government Analyst of the result of his analysis of samples of the oil taken by a person nominated by the Minister of Mines ;
- (c) A declaration pursuant to “The Statutory Declarations Act, 1835,” that the whole of the oil for which the bonus is claimed was obtained from the bore or well where it is stored.

4. Within 24 hours of the first discovery of oil in the well or bore, notice of such discovery must be sent to the Minister of Mines.

5. Any person who desires at any time to inspect or test the well or bore on behalf of the Minister of Mines must be granted every facility for this purpose.

6. The applicant must have done nothing contrary to the provisions of “The Mining Act, 1893,” or “The Mining Act Amendment Act, 1900,” or of any lease or licence granted to the applicant under either of these Acts.

R. BUTLER, Minister of Mines.

CRUSHING AND CYANIDING PLANTS.

RETURNS FROM GOVERNMENT CRUSHING AND CYANIDING PLANTS
FOR THE HALF-YEAR ENDED DECEMBER 31st, 1914.

Name of Mine.	Locality.	Weight of Ore.	Gold Bullion Recovered.	Total Value of Bullion.	Yield per Ton, in Shillings
		Tons cwt. qrs.	Ozs. dwts. grs.	£ s. d.	s.
MOUNT TORRENS BATTERY AND CYANIDE WORKS.					
Crane's Reef	Blumberg	20 10 0	7 11 17	28 7 8	27½
Crane's Reef	"	30 0 0	6 8 12	24 0 0	16
R. Hall	Forest Range	14 0 0	13 13 12	51 1 1	73
Cahill Bros.	Blumberg	20 10 0	41 2 19	158 9 6	154½
R. Hall	Forest Range	20 0 0	23 18 4	87 2 6	87
Total		105 0 0	92 14 16	349 0 9	66½
Grand total since starting of battery ..		10,538 11 3	6,018 9 7	22,778 1 10	43½

GLENLOTH BATTERY AND CYANIDE WORKS.

Lone Hand	Glenloth	25 0 0	17 7 11	55 11 10	44½
Mt. Mitchell	"	10 9 0	3 16 2	11 13 0	22½
Mt. Mitchell	"	18 0 0	3 10 4	11 2 5	12½
Lone Hand	"	12 10 0	8 7 9	28 4 10	45
Total		65 19 0	33 1 2	106 12 1	32½
Grand total since starting of battery ..		2,581 9 0	2,201 13 1	7,365 1 8	5½

TARCOOLA BATTERY AND CYANIDE WORKS.

Royal George	Tarcoola	75 0 0	32 9 16	112 17 7	30
Government Mine ..	"	4 17 0	3 7 10	13 9 11	55½
Morning Star	"	29 0 0	8 3 5	27 0 7	18½
Enterprise Lease	"	15 10 0	18 19 11	64 7 5	83
Royal George	"	50 0 6	17 8 10	63 7 4	25½
Enterprise Lease	"	25 0 0	42 9 6	149 13 6	119¾
Tarcoola Perseverance	"	50 0 0	71 12 17	258 2 8	103½
Day Dawn	"	8 10 0	2 4 6	7 7 8	17½
Day Dawn	"	10 10 0	3 14 21	12 0 9	22¾
Tarcoola Blocks	"	14 10 0	91 4 12	269 11 2	371¾
Royal George	"	50 0 0	63 19 16	233 19 3	93½
Morning Star	"	14 0 0	15 9 4	53 18 2	77
Tarcoola Perseverance	"	50 0 0	130 5 15	502 12 3	201
Day Dawn	"	33 0 0	3 14 2	11 11 6	7
Enterprise	"	30 0 0	47 1 7	152 3 10	101½
Total		459 17 0	552 3 14	1,932 3 7	84
Grand total since starting of battery ..		5,405 2 0	8,260 9 12	29,044 17 3	107½

PETERSBURG BATTERY AND CYANIDE WORKS.

Downs	Terowie	31 0 0	3 18 22	14 3 1	9
New Milo	Wadnaminga	11 5 0	19 1 11	64 8 0	114½
Homeward Bound ..	Mannahill	7 5 9	9 9 4	36 14 11	101½
Dustholes	Mount Grainger ..	7 16 0	1 6 1	4 5 8	11
Mount Grainger	Mount Grainger ..	1 4 0	0 10 20	1 19 11	33½
Homeward Bound ..	Mannahill	5 0 0	2 5 3	8 9 9	34
Total		63 10 0	36 14 13	130 1 4	41
Grand total since starting of battery ..		4,955 10 0	4,436 9 4	16,522 1 3	66½

RETURNS FROM CRUSHING AND CYANIDING PLANTS (OTHER THAN GOVERNMENT) FOR THE HALF-YEAR ENDED DECEMBER 31ST, 1914.

Name.	Ore Treated.	Gold Bullion Recovered.			Value.			Yield per Ton, in Shillings.
	Tons cwt. qrs.	Ozs.	dwt.	grs.	£	s.	d.	s.
DELORAINÉ GOLD MINE.								
Battery treatment	1,150 0 0	740	0	0	2,928	1	10	—
Total*	1,150 0 0	740	0	0	2,928	1	10	51

* Also 1·67 tons copper, worth £72 1s.

WADNAMINGA (Mr. O. W. ALLANSON).

Virginia (tailings cyanided)	1,400 0 0	253	0	0	542	10	0	72½
Battery treatment	90 0 0	46	15	0	136	6	3	30½
Total	1,490 0 0	299	15	0	678	16	3	9

TOTAL BATTERY AND CYANIDE RETURNS FROM ALL PLANTS FOR SIX MONTHS ENDED DECEMBER 31ST, 1914.

Name.	Ore Treated.	Gold Bullion Recovered.			Value.			Yield per Ton, in Shillings
	Tons. cwt. qrs.	Ozs.	dwt.	grs.	£	s.	d.	s.
Tarcoola	459 17 0	552	3	14	1,932	3	7	84
Glenloth	65 19 0	33	1	2	106	12	1	32½
Petersburg	63 10 0	36	14	13	130	1	4	41
Mount Torrens	105 0 0	92	14	16	349	0	9	66½
Deloraine	1,150 0 0	740	0	0	2,928	1	10	51
Wadnaminga	1,490 0 0	299	15	0	678	16	3	9
Total	3,334 6 0	1,754	8	21	6,124	15	10	36½

COPPER.

AVERAGE MONTHLY PRICE OF COPPER, JULY TO DECEMBER, 1914

	Standard.				Best Selected.		
	£	s.	d.		£	s.	d.
July	60	13	0	..	65	8	1
August	No quotation.						
September	No quotation			..	58	7	3
October	No quotation			..	55	5	0
November	52	19	2	..	57	1	3
December	56	18	5	..	61	8	6
Average for the six months.....	56	16	10	..	59	10	0

AVERAGE PRICE OF STANDARD COPPER FOR THE LAST TEN YEARS.

	£	s.	d.		£	s.	d.
1905	64	16	10	1910	57	3	3
1906	87	8	10	1911	56	1	10
1907	82	1	11	1912	73	1	3
1908	60	0	10	1913	68	5	8
1909	58	17	2	1914	60	8	1*

Average for the 10 years, £66 16s. 7d.

* Quotations for nine months only.

REPORTS ON BORING OPERATIONS.

BORING OPERATIONS AT THE POONA AND MATTAPARA MINES,
MOONTA.*Report by Mr. A. W. Matthews, Foreman.*

The boring has proved the lode for a distance of 330ft. in length, and to depths ranging from 223ft. to 360ft.

No. 1 BORE (*vide* Review No. 20, page 16).

Continued from 522ft. to 600ft. in hard red felsite porphyry, and, as the lode had been drilled through, boring was discontinued.

No. 2 BORE.

Started 91ft. W. of No. 1, and 66ft. farther back. Angle of bore 1 in 10, to cut the lode at 300ft.

Surface	
to	Surface loam, limestone, and clay.
14ft.	
to	Decomposed country (not making core).
28ft.	
to	Sandstone and small seams of ironstone.
31ft.	
to	Sandstone with small quartz and ironstone veins.
43ft.	
to	Sandstone.
70ft.	
to	Very broken felsite porphyry.
132ft.	
to	Felsite porphyry.
220ft.	
to	Mineralised red country rock.
239ft.	
to	Country showing occasional splashes of yellow sulphide.
264ft.	
to	Felsite porphyry.
289ft.	
to	Formation showing quartz veins, and carrying a little yellow sulphide
303ft. 5in.	and iron pyrites.
to	Low-grade lode consisting of quartz heavily charged with tourmaline,
311ft. 5in.	and carrying a little yellow sulphide.
to	Hard red country.
316ft.	
to	Red felsite porphyry showing veins and splashes of yellow sulphide.
324ft. 7in.	
to	Lode formation, low grade, carrying veins of yellow sulphide.
332ft. 7in.	
to	Hard red country with occasional small quartz veins and slightly
349ft.	mineralised.
to	Red country rock.
412ft.	
to	Quartz.
412ft. 6in.	
to	Hard red felsite porphyry.
425ft.	

No. 3 BORE.

139ft. E. of No. 1. Angle 1 in 10, to cut the lode at 50ft.

- Surface
- to Loam, limestone, and clay.
- 13ft.
- to Sandstone.
- 35ft.
- to Broken felsite porphyry.
- 149ft. 6in.
- to Quartz showing a little yellow sulphide.
- 150ft. 6in.
- to Broken red country.
- 194ft.
- to Quartz.
- 194ft. lin.
- to Broken red country.
- 296ft.
- to Grey and blue country rock.
- 304ft.
- to Red country rock.
- 363ft.
- to Quartz lode, low grade, carrying yellow sulphide.
- 371ft.
- to Broken country rock.
- 377ft.
- to Formation consisting of schist and porphyry, intersected with quartz
- 406ft. leaders showing seams of yellow sulphide.
- to Quartz lode showing a little yellow sulphide
- 408ft.
- to Hard red felsite porphyry.
- 440ft.

No. 4 BORE.

100ft. W. of No. 2. Angle 1 in 10, to cut the lode at 300ft.

- Surface
- to Loam.
- 3ft.
- to Limestone and clay.
- 21ft.
- to Red sandstone.
- 57ft.
- to Red and blue country rock, porphyry, and schist.
- 66ft.
- to Very broken grey country.
- 75ft.
- to Red country rock.
- 195ft. 9in.
- to Formation carrying quartz veins.
- 197ft.
- to Red country rock.
- 272ft.
- to Quartz.
- 273ft.
- to Broken red country.
- 285ft. 7in.
- to Formation carrying quartz veins, and showing splashes of yellow
- 303ft. sulphide.
- Boring in progress.

BORING OPERATIONS AT THE CALCOOKRA MINE, NEAR FRANKLIN HARBOR.

Report by Mr. C. F. Duffield, Foreman.

On the completion of boring operations for coal at Paradise (*vide* Review No. 20) the plant was shipped to the Franklin Harbor district, to ascertain, in the first place, the value of the copper lodes on the Calcookra Mine.

This mine is situated in the hundred of Hawker, 18 miles W. from Franklin Harbor.

No. 1 Bore.

Situated 212ft. S.E. of the outcrop, which dips at an angle of 50° S.E.

Angle of bore 20 in 100, to cut the lode at 200ft.

Surface	
to	Surface loam.
2ft.	
to	Schist and broken quartz.
14ft.	
to	Diorite.
14ft. 6in.	
to	Schist country with bars of quartz.
44ft.	
to	Calcite and quartz.
60ft.	
to	Hard broken quartzite.
80ft.	
to	Mixture of micaceous schist, quartz, and calcite.
100ft.	
to	Schist and calcite.
113ft. 6in.	
to	Broken quartzite.
128ft.	
to	Micaceous schist, calcite, and quartz.
150ft.	
to	Solid quartz.
151ft. 3in.	
to	Broken quartzite country showing pyrites from 154ft.
185ft.	
to	Schist and quartzite.
208ft.	
to	Calcite and quartz carrying a little pyrites.
213ft.	
to	Very broken schist and quartzite country. At 216ft. the country
219ft.	appears to turn in the opposite direction, and dip parallel with the bore.
to	Calcite and quartz.
273ft.	
to	Schist, with occasional bars quartz and calcite.
304ft.	
to	Quartz.
306ft.	
to	Micaceous schist, quartz, and calcite.
388ft.	

Bore completed on October 17th.

The plant was then removed to a site situated 80ft. N.W. of No. 1, and 132ft. S.E. of the outcrop. Angle of bore 30 in 100. a 3in. diamond bit being used.

Surface	
to	Micaceous schist.
60ft.	
to	Broken calcite and quartz mixed with a little schist.
100ft.	
to	Schist country.
106ft.	
to	Quartz and calcite.
119ft.	
to	Friable lode material heavily charged with iron pyrites.
124ft.	
to	Quartzite showing pyrites.
137ft.	
to	Schist country.
140ft.	
to	Schist, calcite, and quartz country.
275ft.	

Bore completed on December 12th, 1914.

The plant was then erected on No. 3 bore, situated 100ft. N.E. from No. 2, and 234ft. from the outcrop, to cut the lode at 200ft. Angle of bore 30 in 100.

SUBSIDIES.

The Legislature provided in the Mining Act, 1893, and in previous measures for the encouragement of Mining.

The following schedule shows what subsidies have been paid from the inception of the system to December 31st, 1914, and the sums repaid. In the ordinary way these repayments are made from profits—50 per cent. of such profits being devoted to repayments. In two instances only have the profits won enabled full repayments to be accomplished—the Crystal Mine, at Echunga, which repaid £76 7s. 6d. from that source, and the once-famous New Alma and Victoria Mine, Waukaringa, which repaid in full the first subsidy, £3,000. The remainder of the recoveries was derived from sales of mining plant held as security. The total of the subsidies advanced is £60,255 2s. 7d. of which £7,597 7s. 10d. has been recovered, leaving a debit balance of £52,657 14s. 9d. Portion of this outstanding debt is represented by machinery that has fallen into the hands of the Government; add to this the value of the metals won, and the State in general will probably have benefited beyond the money value of the debit balance.

STATEMENT OF SUBSIDIES PAID FROM COMMENCEMENT TO DECEMBER 31st, 1914.

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.			Amount Repaid.		
		£	s.	d.	£	s.	d.
Adelaide Crushing, Grinding, and Amalgamating Mill Co.	—	100	0	0	—		
Algebuckina Gold Mining Syndicate	Algebuckina	52	10	11	52	10	11
Alma Extended Gold Mining Co.	Waukaringa	3,000	0	0	172	5	0
Backhouse, T. S.	Worturpa	100	0	0	—		
Barossa Enterprise Gold Mining Coy.	Barossa, Hundred of ..	232	2	6	—		
Belalie Copper Mining Syndicate	Bundaleer	392	12	3	—		
Beltana Rapid Ore Treatment Syndicate ..	Near Beltana	461	13	9	—		
Bevilaqua & Angel	Palmer (near)	57	18	0	—		
Bird-in-Hand Gold Mining Co., Ltd.	Woodside	3,000	0	0	—		
Blackfellow's Creek Gold Mining Co., Ltd. .	Kuitpo, Hundred of ..	660	6	7	35	0	0
Callington Copper Mining Co.	Callington	148	8	7	—		
Cockburn Copper Mining Co., N.L.	Mutooroo	273	18	5	173	13	8
Commonwealth Silver-lead Co., Ltd.	Strathalbyn, Hund. of	750	0	0	52	17	9
Copper Hill Mining Co., N.L.	Kadina	391	15	6	115	0	0
Cornwall Copper Mining Syndicate, N.L. ..	Kadina, Hundred of ..	500	0	0	—		
Countess of Jersey Gold Mining Co., N.L. .	Wadnaminga	321	0	0	—		
Cowell Consolidated Silver and Copper Mines	Hds. Miltalie & Hawker	361	15	11	—		
Currency Creek Copper Mining Co.	Currency Creek	28	6	5	20	0	3
Crystal Gold Mining Co.	Echunga	563	17	6	176	7	6
Davis, A. (Doris Fabian Mine)	Leigh's Creek, Near ..	250	0	0	—		
Ding Dong Copper Mining Syndicate	Kanmantoo, Hund. of	124	0	4	—		
Duke of Cornwall Gold Mining Syndicate ..	Mount Pleasant	458	17	4	43	10	0
Eagle Silver Mining Co., Ltd.	Glen Osmond	500	0	0	—		
Ediacara Consols Silver Mining Co., N.L. .	Ediacara	651	12	1	465	17	0
Enterprise Copper Mining Co., N.L.	Barossa, Hundred of ..	150	0	0	9	16	0
Enterprise Excelsior (Barossa Amalgamated)	"	2,000	0	0	—		
Eureka Gold Mining Co., Ltd.	Woodside	1,500	0	0	—		
Fifth Creek Central Silver and Copper Mining Co., N.L.	Fifth Creek	253	2	4	—		
Fortress Hill Mining Syndicate	Fortress Hill	60	0	0	—		
Glenloth Mining, Battery, & Options Co., N.L.	Glenloth	515	4	7	515	4	7
Glenloth Wells Pioneer Blocks Co., Ltd.	"	100	0	0	22	18	5
Gumeracha Gold Mining Syndicate	Gumeracha	75	0	0	—		
Golden Point Claims	Wonna	50	0	0	—		
Great Ironclad Gold Mining Co.	Teetulpa	218	6	9	—		
Hakendorf, C. H., and Williams, J. (Glenmarkie Mine)	Glenloth	221	17	6	—		
Hamley Copper Mining Co.	Wallaroo	2,000	0	0	—		
Homeward Bound and Klondyke Gold Mines, N.L.	Mannahill	192	17	1	8	8	9

STATEMENT OF SUBSIDIES PAID—continued.

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.	Amount Repaid.
		£ s. d.	£ s. d.
Heithersay, J. (Kirkeeks Treasure Mine) ..	Waukaringa	502 12 0	—
Hunter Bros. (Lady Millicent Mine and Nuccaleena Mines)	Mochatoona	456 19 0	—
Ireby Gold Mining Syndicate	Mount Grainger	35 4 3	—
Kanappa Copper Mining Co.	Hundred Angas	146 19 11	—
Kanmantoo Copper Mines Syndicate, N.L. .	Kanmantoo	150 2 1	—
Kingsborough, W. A. (Benowrie Mine)	Near Cutana	31 18 6	—
Kirkeek's Treasure Gold Mining Co.	Waukaringa	691 8 1	—
King's Bluff G.M. Co., N.L.	Olary	622 0 8	—
Kobinoor Gold Mining Co., N.L.	Kangaroo Island	100 0 0	—
Kobinoor Mine (H. G. Taylor)	"	200 0 0	—
Lady Alice Gold Mining Co.	Barossa, Hundred of ..	1,797 2 3	—
Lady Franklin Syndicate	Port Lincoln	200 0 0	40 0 0
Leigh's Creek South Coal Mining Co., N.L.	Leigh's Creek	95 16 4	95 16 4
McMurtie's Claims	Kuitpo, Hundred of ..	199 19 11	—
Mingary Gold Mining Co.	New Luxemburg	400 0 0	—
Montacute Gold and Copper Mining Co., N.L.	Sixth Creek	400 0 0	—
Mount Victoria Mine	Bimbowrie	50 0 0	—
Mount Malvern Silver Mining Co.	Blackwood	491 3 6	—
Mount Malvern Silver-lead Mining Co., N.L.	Clarendon	1,347 15 3	—
Mount Pangæus Gold Mining Co.	Hahndorf (near)	56 1 4	—
Mount Monster Gold Mining Syndicate	Kuitpo, Hundred of ..	350 0 0	1 0 0
Mt. Grainger Ironclad Gold Mining Syn., Ltd.	Mount Grainger	21 18 10	—
Mount Torrens Gold Mining Co.	Mount Torrens	1,000 0 0	—
Mount Remarkable Mining Co., Ltd.	Wongyarra, Hund. of	122 8 1	15 0 0
Musgrave Ranges Prospecting Association ..	Musgrave Ranges	47 2 0	—
Mount Painter Corundum and Gem Syndicate	Mount Painter	47 3 1	—
Morning Star Gold Mining Co.	Teetulpa	68 4 6	—
Mutooroo Copper and Silver Mining Co., Ltd.	Mutooroo	500 0 0	500 0 0
Nackara Proprietary Copper Mining Co., N.L.	Nackara	100 0 0	—
Nackara Proprietary Gold Mining Syndicate.	Nackara	160 0 0	—
New Banksia Gold Mining Syndicate	Nairne	250 0 0	—
New Alma and Victoria Gold Mining Co., Ltd.	Waukaringa	3,000 0 0	3,000 0 0
New Ajax Consolidated Gold Mining Co., N.L.	"	750 0 0	—
New Era Gold Mining Co., Ltd.	Woodside	1,000 0 0	—
New Glenloth Battery and Mining Co., N.L.	Glenloth	750 0 0	—
New Medora and Grainger Gold Mines Syn., N.L.	Mount Grainger	1,421 9 9	—
New Mingary Gold Mining Co.	New Luxemburg	250 0 0	—
New Mount Grainger Gold Mines, N.L.	Mount Grainger	393 7 1	220 0 0
Northern Mining and Smelting Co., N.L. ..	Mount Fliton	350 0 0	3 15 0
North Nairne Gold Mining Co.	Nairne	500 0 0	—
North-West and West Australian Pros. Co. .	North-west of S.A. .	104 9 7	—
North-West Prospecting Association, N.L. .	Tarcoola	150 0 0	—
Nil Desperandum Teetulpa Devt. Co., N.L. .	Teetulpa	64 14 4	20 5 6
Nilpena Copper Mining Co., Ltd.	Blinman	290 5 3	—
Olivaster Silver-Lead Mining Co., N.L.	Hundred Yankalilla ..	85 5 4	—
Onkaparinga Dredging and Mining Co., and Echunga Propy. Hydraulic Gold Sluicing Co.	Biggs' Flat	1,050 0 0	700 0 0
Paul's Consolidated Copper Propy., N.L. ..	Burr Well	525 0 0	13 9 0
Parara Mining Co., N.L.	Maitland	571 3 6	—
Paringa Mining Syndicate	Callington	399 16 8	244 0 0
Paringa and West Kanmantoo Consolidated Copper Mine, N.L.	"	1,144 3 4	10 5 0
Pioneer Gold and Copper Mining Syndicate	"	95 15 6	—
Polmear, W. J. L.	Kadina	800 0 0	—
Queen Bee Mining Co., N.L.	New Luxemburg	250 0 0	250 0 0
Quorn Manganese and Silver Mining Co. ...	Quorn	10 9 10	—
Rapid Bay Silver Mining Co., N.L.	Yankalilla, Hund. of ..	136 2 4	—
Robertstown Bright Silver Lead Mines	Hd. Bright	170 5 11	—
Royal Charlie Gold Mining Co.	Mannahill	153 18 5	—
Rees, R., Ajax Mine	Waukaringa	604 14 5	—
Sixth Creek Gold & Copper Mining Co., N.L.	Sixth Creek	161 1 11	—

STATEMENT OF SUBSIDIES PAID—*continued.*

Name of Company or Person to whom Subsidy Granted.	Locality.	Amount Advanced.	Amount Repaid.
		£ s. d.	£ s. d.
Stainbank, A. T.	Fifth Creek.	70 14 11	—
Sliding Rock Copper Proprietary, N.L.	Sliding Rock.	2,000 0 0	27 17 0
Tarcoola Blocks Gold Mining Co., Ltd.	Tarcoola.	3,995 5 2	150 19 11
Tarcoola Enterprise Gold Mining Co., N.L.	"	100 0 0	19 10 4
Tarcoola Proprietary Gold Mines, N.L.	Tarcoola.	150 4 4	9 15 0
Teatree Gully Gold Mining and Pros. Assn.	Teatree Gully.	234 5 7	—
Teetulpa Mining and Crushing Co.	Teetulpa.	349 11 4	—
Teetulpa Prospecting Syndicate.	"	49 15 6	—
Tumby Bay Copper Mining Co., N.L.	Hutchison, Hund. of..	615 0 0	—
Utica Copper Mining Co. N.L.	Burra.	181 2 1	—
Victoria Hill Amalgamated Gold Mining Syn.	Barossa, Hundred of ..	38 12 6	—
Victoria Tower Mining Co., N.L.	Mannahill.	345 18 9	90 0 0
Warrakimbo Propy. Copper Mining Synd. ..	Barndioota, Hundred of	220 16 2	—
Warra Warra Propy. Copper Mines, N.L. ..	Farina.	322 4 11	322 4 11
Watt's Gully Gold Mining Co.	Gumeracha.	50 0 0	—
Watt's Gully Reef Claims.	Gumeracha.	50 0 0	—
Wolters, F. C., & Co.	Echunga.	25 0 0	—
Walleroo Central Mining Co., N.L.	Kadina.	500 0 0	—
Westward Ho Mine (Dr. H. Dixon)	Mannahill.	1,000 0 0	—
Wohler, H., & Co.	Myponga.	20 0 0	—
Wheal Turner Copper Mining Co., Ltd.	Prospecting on proposed line to Queensl'd Border	1,000 0 0	—
Winnininnie Gold & Silver Propy. Co., N.L.	Winnininnie.	86 3 6	—
Woodside Boring and Mining Syndicate	Woodside.	422 17 11	—
Worturpa Exploration and Mining Co., Ltd.	Worturpa.	800 0 0	—
Yelta New Copper Mining Co., N.L.	Walleroo.	1,000 0 0	—
Young Bullfinch Gold Mining Co., N.L.	Talunga, Hundred of	146 3 4	—
Totals	—	60,255 2 7	7,597 7 10

ACCIDENTS IN MINES AND QUARRIES.

A gratifying feature of our mining operations in mines and quarries is the infrequency of serious accidents. Act No. 858 of 1904, bringing quarries in the same category as mines as regards the control of the Chief Inspector of Mines has been effective in safeguarding the interests of quarry-men. The following table gives the number of accidents in mines and quarries during the last ten years:—

ACCIDENTS IN MINES AND QUARRIES.

ACCIDENTS IN MINES.				ACCIDENTS IN QUARRIES.			
Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.	Year.	Total Number of Accidents Reported.	Number of Persons Injured.	Number of Persons Killed.
1905	3	1	3	1905	—	—	—
1906	5	—	3	1906	1	1	—
1907	8	4	6	1907	3	1	2
1908	5	4	1	1908	—	—	—
1909	6	5	1	1909	1	1	—
1910	5	3	3	1910	2	1	1
1911	2	—	2	1911	—	—	—
1912	3	2	1	1912	2	—	2
1913	10	8	2	1913	—	—	—
1914	3	2	1	1914	3	2	1

ASSAYS AT SCHOOL OF MINES.

NUMBER OF ASSAYS MADE FOR PUBLIC PURPOSES AT THE
SCHOOL OF MINES ASSAY DEPARTMENT DURING THE
SIX MONTHS ENDED DECEMBER 31ST, 1914.

	1914.					
	July.	August.	Sept.	October.	Nov.	Dec.
Department of Mines	81	33	91	67	48	85
Public assays.....	179	73	102	73	51	88
Totals.....	260	106	193	140	99	173

DECENNIAL RETURN SHOWING, SO FAR AS CAN BE ASCERTAINED,
OUTPUT AND VALUE OF VARIOUS METALS AND MINERALS
PRODUCED IN SOUTH AUSTRALIA.

Year.	GOLD.		SILVER.		SILVER LEAD ORE.		COPPER.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Ounces.	£	Ounces.	£	Tons.	£	Cwts.	£
1905	10,983	45,853	—	—	—	—	130,959	426,511
1906	8,037	27,000	801	104	—	—	164,160	718,609
1907	5,609	20,540	5,845	780	1,000	11,000	168,620	690,000
1908	2,908	12,300	—	—	900	9,000	112,554	338,000
1909	7,111	30,206	1,660	167	70	416	113,940	334,584
1910	6,603	28,000	6,250	625	25	22	102,040	306,120
1911	3,537	15,000	1,400	140	—	—	118,440	332,500
1912	6,592	28,000	2,700	326	—	—	125,900	461,500
1913	6,556	27,800	2,650	300	153	1,100	143,222	488,986
1914	6,258	26,581	3,006	314	18	215	137,614	417,487
Totals	—	261,280	—	2,756	—	21,753	—	4,514,297

Year.	COPPER ORE AND REGULUS.		LEAD.		IRONSTONE FLUX.		LIMESTONE FLUX.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
	Tons.	£	Cwts.	£	Tons.	£	Tons.	£
1905	2,563	28,434	1,040	369	84,483	48,577	44,498	4,791
1906	—	—	1,000	550	75,226	33,852	31,940	4,791
1907	—	—	—	—	84,600	38,100	31,100	5,800
1908	—	—	—	—	88,000	39,600	29,500	6,000
1909	1,230	4,003	140	90	16,120	8,296	13,765	2,464
1910	—	*9,350	400	260	46,200	21,945	18,600	3,720
1911	—	*11,103	—	—	42,300	26,400	28,700	7,175
1912	—	*10,192	—	—	42,200	26,375	50,600	12,500
1913	—	*8,308	—	—	60,658	37,911	44,300	11,075
1914	—	*8,910	—	—	42,622	37,137	54,054	16,892
Totals	—	80,300	—	1,269	—	318,193	—	75,208

Year.	PHOSPHATE ROCK.		CRUDE SALT.		OTHER METALS AND MINERALS.	Total Value.
	Quantity.	Value.	Quantity.	Value.	Value.	
	Tons.	£	Tons.	£	£	£
1905	5,000	5,000	32,500	13,000	1,261	573,796
1906	5,850	5,850	55,000	27,500	2,209	820,465
1907	8,000	8,000	75,000	37,500	2,500	814,220
1908	11,000	11,000	75,000	37,500	4,500	457,900
1909	3,772	3,697	51,407	25,594	3,873	413,390
1910	5,200	5,200	54,000	27,000	†13,600	415,342
1911	5,800	5,800	65,000	40,600	†11,319	450,037
1912	6,100	6,100	64,300	40,187	†10,490	595,670
1913	5,950	6,545	65,000	48,750	†11,851	642,626
1914	6,083	6,691	65,000	48,750	†37,378	600,355
Totals	—	63,883	—	346,381	98,981	5,784,301

* Bluestone, £5,940; Sulphuric Acid, £3,370. † Including Gypsum, £9,000; Pyrites, £3,270.

“ £4,163 “ £6,940 “ £7,275; “ £2,580.
“ £2,550 “ £7,642 “ £9,000.
“ £325 “ £7,983 “ £5,362; Radium and Radio-Active Material, £3,620.
“ — “ £8,910 “ £12,207; Kaolin, £16,382.
“ “ “ “ Radium and Radio-Active Material, £5,215.

REPORTS FORMING ADDENDA TO THE RECORD OF MINES.

REPORT

BY

The Assistant Government Geologist (R. Lockhart Jack, B.E., F.G.S.).

LOCALITY—NORTH.

ALUNITE DISCOVERY ON SECTION 310, HUNDRED OF NAPPERBY.

In accordance with instructions from the Hon. the Minister of Mines, the writer, on February 4th, inspected the alunite discovery on section 310, hundred of Napperby, a freehold owned by Mr. F. C. Clarke. The discovery was made in a steep gully in the S. portion of the section, heading opposite section 150, hundred of Howe. The alunite is exposed *in situ* at intervals over a distance of 40yds., where the gully has a general course of W. 20° S. The steep slopes of the gully are soil-covered, and only scattered float stones of alunite are visible on the S. slope.

Starting from the junction of the gully with a larger creek, shaly slates, with thin quartzite and limestone beds, quartzite, dark limestone and flint are crossed in ascending order, and dip about 45° to the E.S.E.

A little below the alunite deposit the gully cuts through beds of sandstone and shale, which dip at a low angle to the S.E., gradually swinging round to E. 10° S. The alunite is developed in the shale, which, as the gully is followed up-stream, becomes more calcareous. The deposits appear to have been formed by more or less complete replacement of the shale, as traces of the bedding may be seen in all but the purest specimens.

The westernmost sample (No. 1) was taken from a few inches of white material lying with the shale, and showing bedding planes. Eight yards to the E.N.E. the largest body is exposed, and has a width of 3ft. to 3½ft. It is almost vertical, dipping very steeply to the W., and extends into the S. bank of the gully. Sample 2, of the pure material, and sample 3, of a less pure material, are from this spot. The less pure material, though on the surface of the boulders the alunite shows the typical conchoidal fracture of unglazed porcelain, has in the centre a more granular and chalky fracture.

ASSAYS AND ANALYSES BY W. S. CHAPMAN.

Sample No.	Description.	Potassium Sulphate. %	Containing Potash. K ² O %.	Approximate % of Alunite.
1	Alunite and shale.....	8.83	4.77	51
2	Alunite, with siliceous impurity	16.19	8.75	95
3	Alunite, limestone, and shale.....	12.83	6.93	73
4	Alunite and shale	14.10	7.62	82
5	Alunite and shale.....	15.05	8.13	87
6	Shale and alunite.....	3.76	2.03	21
7	Ferruginous shale and alunite	1.13	0.61	6

No. 3, only, contained an appreciable amount of calcium carbonate.

ANALYSES BY W. S. CHAPMAN.

	Sample 2.	Sample 3.
Silica, SiO_2	2.52	6.56
Alumina, Al_2O_3	34.24	29.36
Ferric oxide, Fe_2O_3 .....	.36	.55
Magnesia, MgO} .....	.14	.23
Lime, CaO} .....	.20	8.48
Soda, Na_2O	1.83	2.10
Potash, K_2O	8.75	6.93
Water at 100°C , H_2O} .....	.50	.50
Water over 100°C , H_2O	14.37	10.00
Carbon dioxide, CO_2	—	6.76
Phosphoric anhydride, P_2O_5 .....	.19	.22
Sulphur trioxide, SO_3	36.47	28.57
Chlorine, Cl} .....	.02	.02
	99.59	100.28

For a distance of 15yds. to the S. of samples 2 and 3 blocks of high-grade alunite are scattered about on the surface, though it cannot be definitely stated that they are from the body exposed in the gully. Sample No. 5 was taken from these scattered blocks.

Three and five yards to the E. of samples Nos. 2 and 3 the caps of two veins, each about 18in. in thickness, show in the bottom of the bank. Sample No. 4 shows the W. body to be of good grade, but sample No. 6 of the E. body shows it to be a weathered shale, impregnated with alunite.

Twenty-one yards farther up-stream a bunch of high grade alunite is visible, and 11yds. beyond this light-colored shale and sandstone occur, in which the shale is to a slight extent replaced by alunite, as is indicated by sample No. 7.

No other exposures *in situ* were visible, owing to the thick soil mantle on the hill slopes, and no alunite was seen on the N. slope of the gully.

The two best veins are included in a width of 15ft., and have, as seen, an aggregate width of 5ft. It would be advisable to open up a face, including these two deposits, and to carry it a few feet S. into the bank of the gully, so that the veins may be better exposed, and the proportion of alunite to waste rock determined, prior to deciding on the best method of mining.

Samples Nos. 2, 3, 4, and 5 are within the area of this preliminary opening, and, if they may be taken as representative, show the alunite to have an average potash content of 7.88 per cent., or 14.54 per cent. of potassium sulphate.

FACILITIES.

The side of the gully in which the alunite is found has a height of over 100ft., and for a while it is probable that the alunite may be best won by open-cut workings. The information gained from these workings will enable further work to be planned. There is no doubt that the alunite will be found to extend below the bottom of the gully, and in following it due provision should be made to avoid the drowning of the workings by floods.

At present the mineral would have to be brought up hill, to the road on the crest of the range, and about 9 miles by road to Warnertown Railway Station; but if the expense of forming a road in places for a mile and a half was justified, it would be possible to have a down hill haul, and to reduce the distance to $6\frac{1}{2}$ miles.

From Warnertown to Port Pirie is a further distance of $8\frac{1}{4}$ miles by rail or road.

Considering the facilities for cheap working, and the present high price of potash salts, the prospects justify opening out the deposit and exploring the ground further by costeaning to the S. of the known exposures.

The utilisation of the mineral has been discussed in the Record of Mining Operations in South Australia, No. 19, and the results of experiments on the extraction of potash are to be found in "The Mineral Resources of the United States for 1912," Vol. II., p. 899. (18-2-15.)

REPORTS

BY

The Chief Registrar of Mines (L. C. E. Gee).

LOCALITY—NORTH-EAST.

Radium Hill.—The concentrating plant has been altered; $4\frac{1}{2}$ tons of concentrates per week have been forwarded to Sydney, but it is hoped to increase this to 6 tons per week. The cap of new lode body has been uncovered a little to the E. of the main lode; it appears heavily charged with carnotite, and the manager (Mr. B. Du Faur) proposes to crosscut from a bottom level of the main shaft towards it.

Owing to the war the market for radium bromide has been much disarranged, and also some company rearrangements are taking place in Sydney; active operations at the mine are therefore temporarily in abeyance.

A Bendigo syndicate has taken over the *Lux* and *Queen Bee Mines*, situated about 13 miles E. from Olary. Machinery, including a five-head battery, has been purchased from the Jubilee Mine, near Silverton, and it is proposed to make bulk tests of Mr. Niemann's process on the ores from these mines, in which gold and copper are associated together.

No work is in progress at the *Cobalt Mine*, about 8 miles N. of Bimbowrie, near Bimba Hill. This mine was favorably reported on by the late Government Geologist (Mr. H. Y. L. Brown) in 1901. Rich cobalt ores in considerable variety were found; a lot of shallow shaft and costeaning work has been done, but I understand that the lack of capital has blocked the way of systematic exploration and mining. This is the more to be deplored as in one of the workings the cap of what may possibly prove a large and rich body of silver-lead ore has been exposed.

This Bimba Hill locality is, indeed, a curious and interesting one in the way of metals and minerals. Copper, cobalt, nickel, and silver-lead occur. This is the only place in Australia in which chialtolites are found in quantity, and specimens of beryl, agate, aventurine, cerulene (a rare variety of copper ore which lends itself to polish as a gem stone), and many other things are found here; their discoveries being mainly due to Mr. G. R. Howden, who has led a solitary prospector's life in the district for nearly 17 years.

The Government Geologist (Mr. L. K. Ward) has kindly contributed the following note:—

"These deposits carrying cobalt are worthy of special attention from prospectors, for the reason that cobalt is a common associate of rich silver ores. This association was found in the Consols Mine of Broken Hill, and still better-known occurrences of the same type of deposit are those of Saxony and Ontario. Prospectors should examine the deposits carefully for signs of native silver, ruby, silver ores

(pyrargyrite and proustite), and argentite. It is, of course, wisest to have assays made of the ore for silver, in order that the richer silver-bearing minerals may not escape notice. Thus the cobalt bloom (erythrite) should not be regarded so much for itself as for its possible association with minerals of higher intrinsic value."

The *Koolka* iron outcrops are situated about 4 miles N.W. from this place. Analysis has shown the ore to be of high grade. Many years ago the Broken Hill people proposed to work this place, and a company, called the *Koolka Mingary Iron Flux Co.*, was formed. Two lines (alternative) of railway were surveyed from near Mingary, but the removal of the smelters to Port Pirie put an end to the enterprise.

Large high-grade deposits of iron ore exist also at *Billeroo*, on the *Bimbowrie Run*, about 12 miles W. from this place.

No work is in progress at present at the *King's Bluff Gold Mine*, near Olary. The property is held by a Broken Hill syndicate.

The revival of interest in *Wadnaminga* has been gradually gaining strength since Mr. O. W. Allanson showed his confidence and pluck by restarting work at the *Old Virginia Mine* some three years ago.

This field was discovered 1888-90, and its palmy days were about 1892-4, when the *Virginia*, *Milo*, and *Countess of Jersey* Mines had each a 10-head battery at work. Records are incomplete, but it would seem that although many rich patches of gold stone were found in the workings (it is stated that one patch in the *Milo* yielded 800ozs. of gold), yet the average gold contents of the reefs were not then considered high enough. There are no returns or figures available showing this; in fact the only fairly reliable returns that could be obtained show that at the *Virginia*, from January, 1892, to August, 1894, 2,752 tons of stone were treated for 3,188ozs. of gold bullion, and at the *Milo* 9,387 tons were treated for 10,474ozs. The bullion averaged about £3 per ounce in value. The late secretary of the *Virginia* and *Milo* stated that these mines had paid £27,000 in dividends. Smaller returns must have followed. The radiance of the Western Australian finds at that time dimmed all other goldfields. The values of what were then termed low-grade propositions were not appreciated, and in this case two of the batteries were sent to Western Australia, the other one ceased working, and finally the township which had sprung up disappeared, and the field was deserted, save for a few old hands who kept themselves going by dollying specimen stone and sending an occasional small parcel of ore to Petersburg for treatment at the Government plant there.

At the *Virginia* Mr. Allanson has erected a five-head battery, driven by a 28-H.P. suction gas engine, and a cyanide plant, with a 6-H.P. petrol engine for pumping purposes. At present mining, crushing, and cyaniding operations are in full swing, and the results are satisfactory to the owners. The tailings dump left by the old company is being re-treated, a good supply of water being available from the old workings. Another five-head is to be added to the battery, and the owners consider that a two years' supply of ore is readily obtainable without deeper sinking. No great vertical depth was attained by the old company, the dip of the lode being at a very low angle.

Total returns to the end of last year show—

Crushing, 457 tons, 182ozs.

Cyanide, 3,905 tons, 826ozs.

A new and very promising find (the *Thunder Queen*) has been made by Messrs. Allanson and Critchley, about 2 miles E. 30° N. from the *Virginia*. The lode seems a strong one, and to have much the same strike and dip as the *Milo* and *Virginia* lodes. At a depth of 30ft. it is 2ft. 6in. wide, and 90 tons recently treated from it gave over an ounce to the ton.

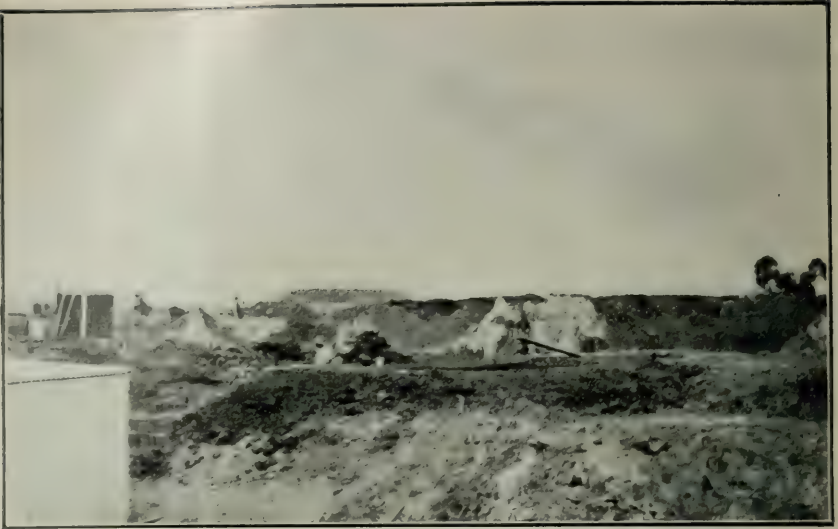


Battery and Cyanide Plant, Virginia Mine, Wadnaminga.



Prospector's Hut, Golden Record Mine, Wadnaminga.





Great Eastern, Wadnaminga.



Great Eastern, Wadnaminga; Milo dump in the distance.

The Great Eastern Syndicate, with Mr. L. E. Saunders manager, is at present re-treating the Milo tailings. Three 30-ton and three 15-ton vats have been installed; 130 tons of tailings are treated per week, and the results are considered satisfactory. It is the intention of the syndicate to erect a battery and raise ore from their property.

At the *Milo* two men are at work. A 16-ton parcel of high-grade ore is ready for transit to Petersburg, but cartage is unobtainable at present.

At the *Old Golden Record* I saw some very rich specimens of gold-bearing stone, and an old prospector is at work searching for rich veins.

There are now about 40 men, women, and children at Wadnaminga, and the revival promises to be permanent and satisfactory.

At the *Homeward Bound*, about 8 miles N.W. from Mannahill, four men are working. Small parcels of stone are sent from time to time for treatment at the Petersburg Government plant. The results are invariably good, and it is to be regretted that the mine has not in the past been worked in a systematic and economical manner, whereby treatment of the ore in bulk would probably have proved it a payable proposition on a fairly large scale, and it is to be hoped that a movement in this direction will take place ere long.

At *Teetulpa* only a few fossickers are at work. This was, perhaps, the best goldfield ever discovered in South Australia. It came to light in October, 1886, as the result of the accidental discovery of a small nugget of gold on the surface by a wandering prospector. At one time 5,000 men were on the field. The area is limited, perhaps not exceeding a square mile in area, but the estimate that £300,000 worth of gold was found is probably well under the mark. It seems incredible that this should be the only spot of rich deposit in the N.E. Geological indications are the same for many miles round, but so far we have not yet been fortunate enough to discover Teetulpa No. 2—but this may happen at any time.

At *Kirkeek's Treasure* everything is ready for starting the plant except water. A dam, of 911,000galls. capacity, has been recently made by the Government to assist the lessee, but unfortunately the heavy rains which have recently visited the N.E. only skirted this locality.

There are about 45,000 tons of sulphide tailings at the *Alma Mine*, which require regrinding before treatment by cyanide, and Mr. Deeble is now conducting experiments at the Alma Extended plant with a view to a combination treatment by mercury and cyanide.

Operations are suspended at the *Ajax Mine*.

Mount Grainger.—Some tributers are at work on the Mount Grainger and Medora property, but the battery is not working. A report on the Mount Grainger goldfield by the Assistant Government Geologist (Mr. R. Lockhart Jack), giving full and clear details of the whole field, has been recently published, and this shows about 2,840 tons were crushed from these workings, the value being a little over 18s. per ton.

Some very good returns have been recently obtained from the *Golden Junction Mine*, and a company has been formed to erect a small battery and treat the ore on the ground.

Several attempts have been made in the past to work the *Dustholes* line of reef, situated 2 miles W. of the Mount Grainger line, and now a good company, with strong hopes of success, has been formed for that purpose, a systematic sampling made by a Melbourne mining engineer being considered satisfactory.

During a fortnight's travel in the N.E. I only saw about 10 rabbits.

REPORTS

BY

The Inspector of Mines (Mr. Henry Jones).*LOCALITY—SOUTH.*

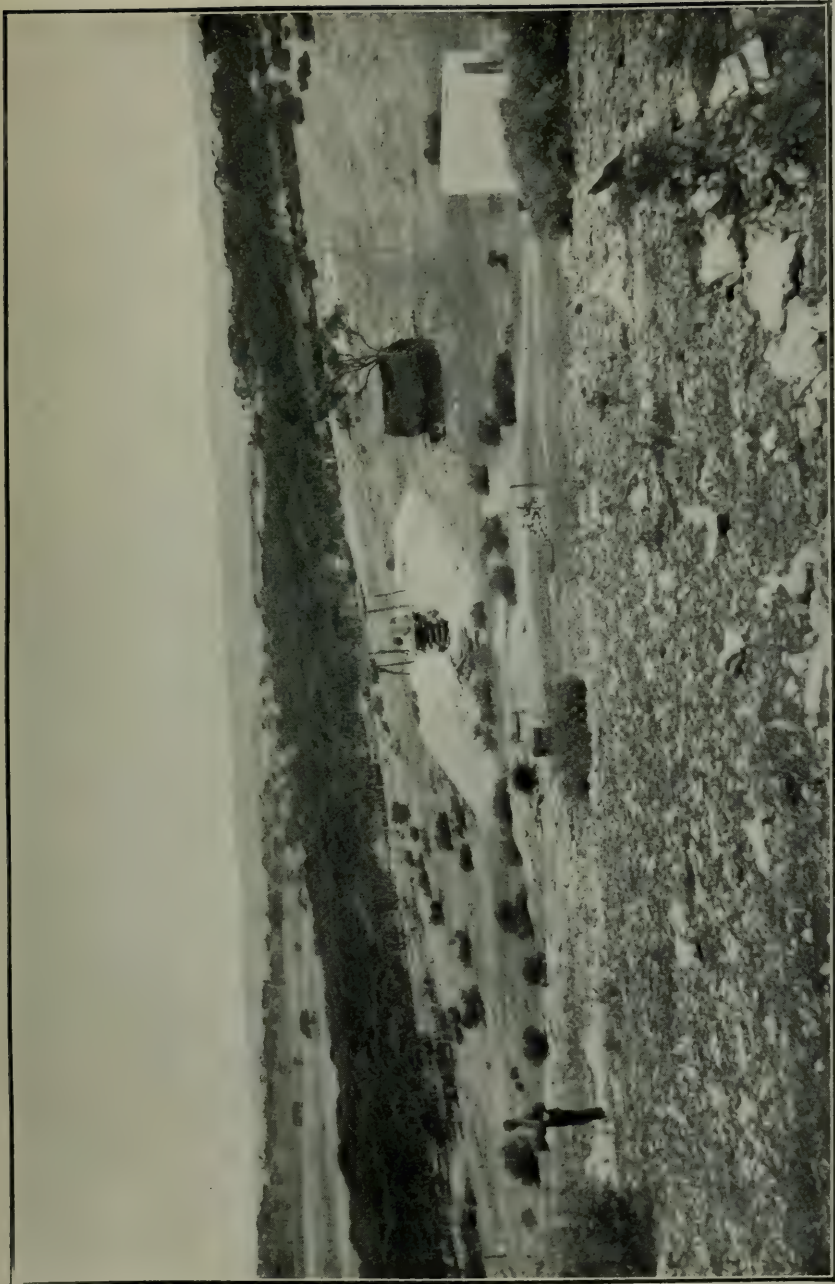
THE OLIVASTER SILVER-LEAD MINE.—Situated on part section 1507, hundred of Yankalilla, 3 miles W. from Second Valley, and $\frac{1}{2}$ mile from Rapid Bay jetty.

A large amount of prospecting work has been done in different parts of the holding by shallow workings, in which are exposed several beds of mineralised calcareous rocks and quartz veins, containing seams and small pockets of fairly rich galena ore.

At one point near the top of the hill an underlie shaft has been sunk to a depth of 132ft., and is connected by a vertical air shaft 20ft. deep at a point 40ft. down from the mouth of the underlie. The formation disclosed in these workings is fairly defined, and consists of ferruginous decomposed claystone and calcite, 2 to 3ft. wide, containing in places small seams of galena. A sample taken at the 50ft. level on the E. side of the underlie from a vein of ore 3in. wide, near the hanging wall, gave 82.1 per cent. lead and 13ozs. 4dwts. of silver per ton.

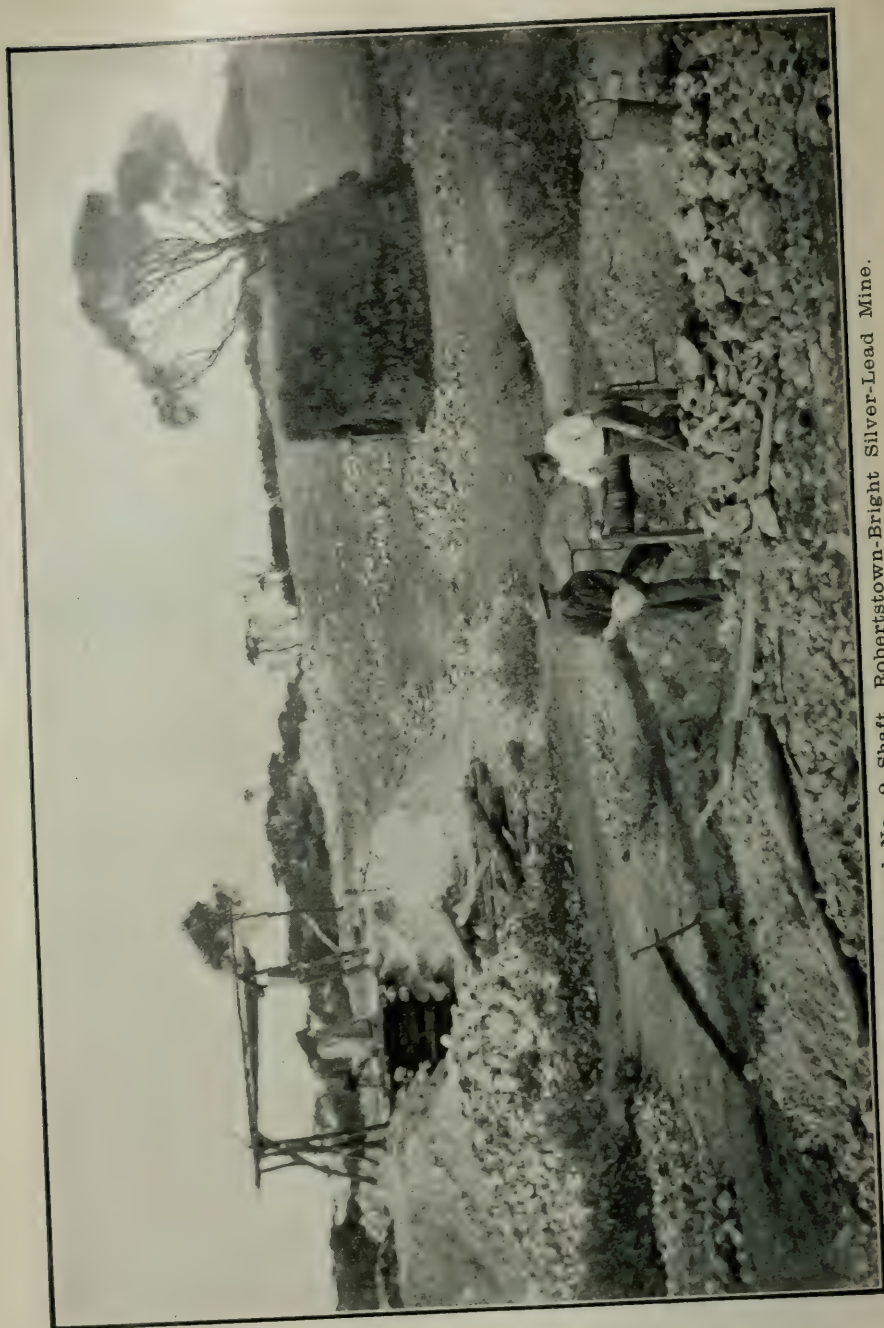
About 140ft. S. from the mouth of the underlie a vertical shaft, 7ft. by 4ft. in the clear, has recently been carried down to a depth of 76ft. At 44ft. level a small crosscut has been extended W. 42ft., where it holes through to the underlie workings. In the crosscut, at a distance of about 30ft. from the shaft, a small fault was intersected bearing N. 20° W., going down with a slight angle to the E. This fault appears to have dislocated the country at this level, but to what extent has not yet been determined. A short distance W. of the fault, on the N. side of the crosscut, ore-bearing material is exposed for a width of 6ft., containing several seams of galena; this body of ore appears promising, and could be further tested by extending drives on its course. A sample taken of the various seams, for a width of 4ft., gave 56.9 per cent. lead and 10ozs. 4dwts. silver per ton. In the face of the crosscut, 42ft. from the shaft, a winze has been sunk to a depth of 57ft., and in it from top to bottom a fairly-defined seam of soft calcareous claystone is exposed 4in. to 10in. wide, bearing E. and W., dip S. The country under the seam is of harder nature, and contains in places nice patches and small seams of galena. A sample taken of the soft seam, for 9in. wide in the bottom of the winze, gave 0.3 per cent. lead and 8dwts. silver per ton. A sample taken of a galena vein, 6in. wide, gave 61.8 per cent. lead and 16ozs. 4dwts. silver. A sample taken of a seam 9in. wide, 30ft. down the winze, gave 14.3 per cent. lead and 3ozs. silver, and a sample taken from a seam 8in. wide, at 25ft. down on the W. side, gave 60.5 per cent. lead and 15ozs. 4dwts. silver per ton. All these samples were taken from various parts of the workings, not as bulk samples, but as showing the value of the various veins of ore exposed. About 10 tons of ore obtained from the various workings treated at Port Pirie works gave a return of 50 per cent. lead and 9ozs. of silver per ton.

At the bottom of the main vertical shaft, 76ft. from the surface, a large drive has recently been extended W. for a total distance of 33ft., and driving is now in progress. At a distance of 10ft. in the drive the fault in the country which is showing in the higher level was intersected, but it does not appear to have disturbed the country to any great extent at this depth. The drive at this level should be carried in to a point under the winze, and connected with the latter for ventilation purposes, and also to enable exploration work to be done at that point, to further prove the ore-bearing material, by driving and crosscutting.



General View, Robertstown-Bright Silver-Lead Mine.





Main Shaft and No. 2 Shaft, Robertstown-Bright Silver-Lead Mine.

The formation so far disclosed in the present shallow workings is ill defined and disturbed, and the ore occurrence is mostly in small pockets and short shoots several feet apart. The work now carried on at the 76ft. level should prove the ore channel in more settled country, where possibly the shoots may be found of greater extent.

A sample taken of the material between the fault walls at 76ft. level showed no value.

A sample taken of the material in the face of the 76ft. drive gave 0·4 per cent. lead.

A sample taken from different parts of a dump of 4 tons of ore on surface gave 36·4 per cent. lead and 8ozs. 4dwts. of silver per ton. (2-9-14.)

LOCALITY—NORTH.

ROBERTSTOWN-BRIGHT SILVER-LEAD (*vide* Reviews No. 17, 18 and 19).—Situated 7 miles from Robertstown.

The main underlie shaft is now down a total depth of 210ft. The lode material exposed in the bottom consists of ferruginous quartz and dolomite, 7in. to 11in. wide, and does not appear to contain much values at present depth. A sample taken of the vein, 6in. wide in N.W. end of the shaft, gave 0·6 per cent. copper, and a sample taken of the vein for a width of 7in. in the S.E. end of the shaft gave 0·8 per cent. copper.

At the bottom of the shaft a crosscut has been extended into the foot-wall for a distance of 15ft., and opposite the last a crosscut has been carried into the hanging-wall for a distance of about 16ft.; the material disclosed in both crosscuts is chiefly country rock containing no values.

No. 2 shaft, situated about 80ft. N.E. from the main workings, is down a total depth of 35ft. The work of repairing and cleaning out this shaft is now in progress, and when completed to the bottom it is the intention of the present owner of the mine to extend drives in the ore channel to further prove the formation along the line of strike, and to connect the two shafts for ventilation.

Two samples taken of the lode at 30ft. level.—No. 1 sample, taken for a width of 8in. in the N.W. end of the shaft, gave no values; No. 2 sample, taken from a width of 12in. S.E. end, gave 15·5 per cent. lead and trace of silver. (8-7-14.)

THE EDELWEISS COPPER MINE (*vide* Record, page 50).—Situated on Block No. 1, hundred of Apoinga.

A large amount of mining appears to have been done at one time on this property. Three shafts have been sunk to depths, it is said, of from 60ft. to 150ft. At the time of my visit no work was in progress, and the underground workings could not be examined, but judging by the size of the various dumps a fair amount of crosscutting and driving must have been done in the different shafts.

There are a number of parallel ferruginous formations of quartz and iron, varying in width from 3in. to 24in., outcropping at different points on the blocks, containing copper carbonates. In the large dump at the main shaft some very fair vein material is showing, containing high-grade copper ore and a little vanadium. A sample taken from the bottom of a hole, 8ft. deep, in one of the veins gave no values. A grade sample taken from a small heap of vein material on top of the main shaft gave 17·6 per cent. copper, 16dwts. silver, and 2·1 per cent. vanadium. A sample taken from an iron vein from 12ft. down the shaft gave nil. A picked sample of best ore showing on top of main shaft gave 23·7 per cent. copper, 12dwts. silver, and 4·5 per cent. vanadium. (9-7-14.)

THE ST. ELMO MINE (CATH BREA *vide* Record page 39 and Reviews 18 and 20).—Situated on section No. 73, hundred of Bright, about 12 miles N.W. from Robertstown.

Since the St. Elmo Prospecting Syndicate acquired the property a considerable amount of shaft-sinking and tunnelling work has been done at different points on the blocks.

The St. Elmo shaft (No. 1) has been carried down to a total depth of 100ft. At the 40ft. level Cummins's crosscut has been carried in a total distance of 53ft. W. At a point 44ft. in the drive two veins of quartz were intersected, 2in. to 3in. wide and 18in. apart, both containing copper, and the adjacent dolomite rock, from that point to the face, shows stains and specks of azurite. A sample taken from No. 1 vein gave 1·8 per cent. copper, and sample from No. 2 vein gave 2 per cent. copper. Sample taken in face of drive, for a width of 6in., gave 1·7 per cent copper.

At the 100ft. level, the bottom of the shaft, the Degenhardt crosscut has been carried in W. a total distance of 83ft. in country rock, consisting chiefly of black slate, containing a fair amount of pyrites, and the largest portion of the crosscut is in dolomite country. Judging by the angle of the veins at the 40ft. level it does not appear that the crosscutting at this level has been carried far enough W. to intersect them on the quartz lode showing on surface W. of the shaft. By extending the present crosscut further W. it would be determined whether the ore-bearing material in the level above is improving in width and value going downwards, but before further work can be carried on in the bottom it will be first necessary to equip the shaft with proper ladders, from surface down to 100ft. level.

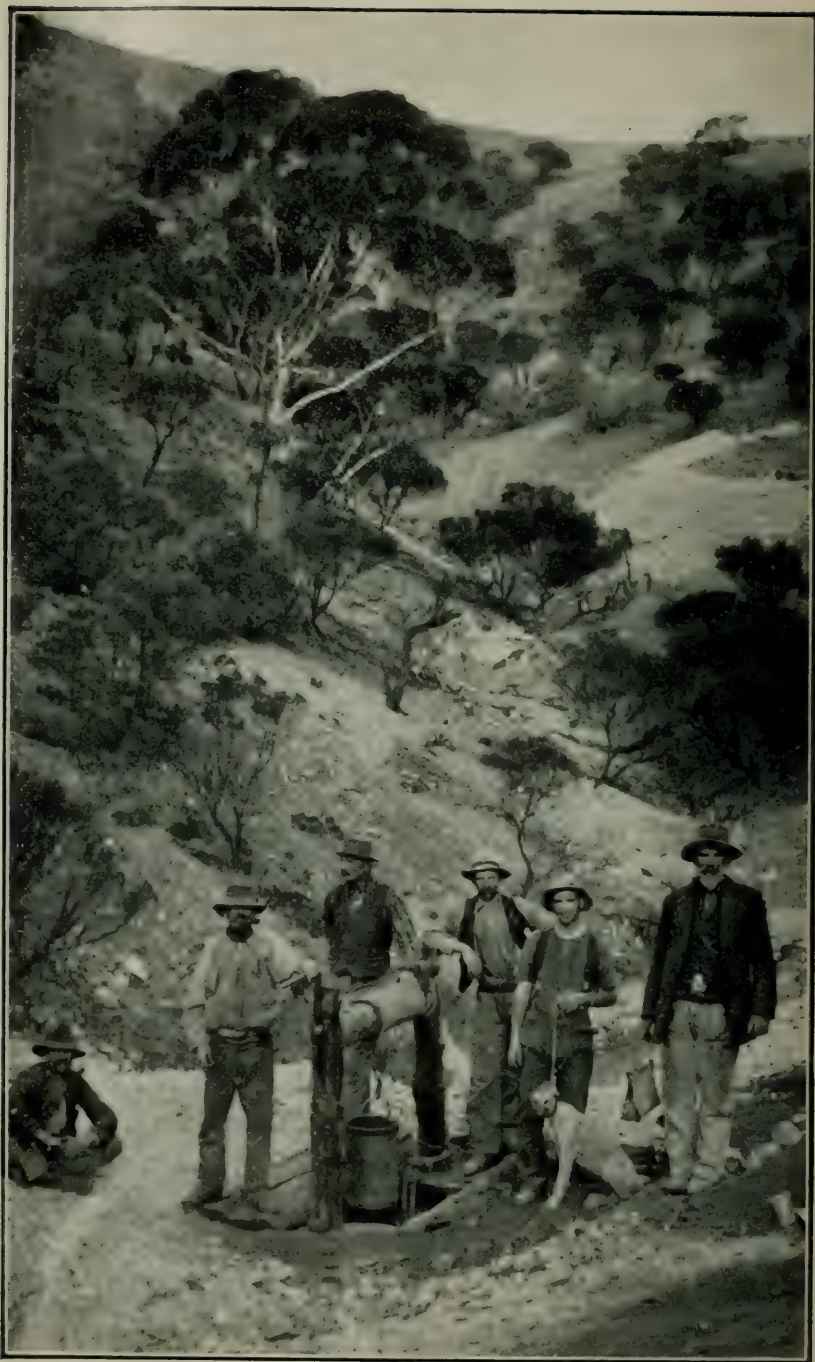
About 200yds. in an E. direction from the St. Elmo workings, on the side of a fairly high hill, No. 2, or Campbell's, shaft has been sunk vertically to a depth of 30ft. At 12ft. down a vein of ore was intersected, bearing N.W. and S.E., dip N.E., through the country rocks, at right angles to the latter's bedding. From the shaft, at 12ft. from surface, a drive on a slight incline has been carried in S.E. on the course of the formation for a total distance of 60ft. The lode formation disclosed along the drive appears fairly defined, and consists of ferruginous quartz veins and dolomite, with little pyrites, 6in. to 20in. wide, much stained with copper carbonates, and containing patches of malachite and azurite in places. Sample taken for full width of lode in the face of drive gave 0·9 per cent. copper, and a sample taken half-way in the drive, for width of lode, gave 3·5 per cent. copper. About 10 tons of fairly good ore were obtained from these workings while driving was in progress, and is now stacked on surface. A sample taken from all over the dump gave 9·2 per cent. copper. There are fairly good indications in the present workings that the vein of ore exposed is likely to continue down, but small breaks in the ore channel may occur at different points at or near the various floors in the country rocks.

At the present stage of the mine the best plan to further prove this ore body would be to select a site for an underlie shaft in the vicinity of the present workings, and sink down in the formation to determine the width and true angle of the ore channel at greater depth, and the work done as stated would be of great assistance for further developing the property.

At the foot of the hills, 107ft. vertical below Campbell's shaft, Bosomworth's tunnel has been extended in a N.E. direction into the hill for a distance of 289ft., and is now several feet past the point under Campbell's workings, but does not appear to have been extended far enough N.E. to intersect the formation showing in the latter.

At a point 58ft. in from the mouth of the tunnel a small vein was intersected, 2in. wide, containing a little pyrites and copper. A sample taken of the vein gave 1·3 per cent. copper.

At a point 141ft. in the tunnel a ferruginous formation, 20in. wide, was intersected, bearing N.W. by S.E., dipping S.W. Off the tunnel a drive has been extended S.E. on the course of the formation for a total distance of 53ft., and from the bottom of the tunnel a winze has been sunk in the lode to a depth of 14ft. The material disclosed in all these workings is chiefly ferruginous quartz veins and



Shaft, St. Elmo Mine, Hundred of Bright.

decomposed dolomite, and, as shown by three samples taken from different parts of the winze and drive, it does not appear to contain any mineral of value at this level.

The best prospects at present in the various workings appear to be the ore body exposed in Campbell's workings, and this could be further tested, as already stated, by sinking an underlie shaft in the formation down to the level of the tunnel. This work would show the width and value of the ore to a depth of over 100ft., and if it proved of a payable nature the tunnel workings could be extended to connect with the underlie shaft. (31-7-14.)

WEST BURRA COPPER MINE (*vide* Reviews Nos. 18, 19, and 20).

The main underlie shaft has recently been continued from the 62ft. level to a depth of 100ft., on the same angle of dip as the upper portion of the shaft, where the formation proved of a persistent nature for a depth of 50ft., and contained high-grade copper ore.

At a point about 62ft. in the shaft there is strong evidence of dislocation occurring in the formation, and the ore channel showing and passed through in sinking appears to be going down almost vertically into the footwall. From that point sinking was carried down to 90ft. in barren and much-disturbed country rock. From the 90ft. to 100ft. level the country is more settled, and appears very favorable for working and extending a crosscut into the footwall, to further test and locate the ore channel that crossed the shaft at the 62ft. level, which, if it continue down, should be intersected at a distance of about 20ft. from the shaft.

At the 100ft. level in the shaft a small cross vein was intersected, bearing N.W. and S.E., dipping S.W. A winze was recently started at a point near the bottom of the shaft, and carried down in the vein to a depth of 54ft., making the total depth 154ft. from the surface. Sinking is still in progress, and the intention is to continue the sinking of this winze down to water level. The vein disclosed all the way down the winze is well defined, and consists mainly of soft decomposed ferruginous claystone and calcite, containing a little copper carbonates and copper stains in places. A sample taken of the vein, for a width of 6in. in the bottom of the winze, gave 2.9 per cent. copper. Two samples taken of the vein, for a width of 9in. half-way down the winze, each gave a trace of copper. A sample taken from a small dump of ore on surface, obtained from the 50ft. level main shaft, gave 33.3 per cent. copper.

The prospects of the lode formation at the 50ft. level in the main shaft appear very promising, and could be tested to a greater extent at this point by extending drives both ways along the course of the lode.

At the 100ft. level there are fairly good indications of the country being more settled, which fully justify crosscutting, to determine the true position of the main ore channel at that level. (25-8-14.)

THE UTICA COPPER MINE (*vide* Reviews Nos. 16, 18, 19, and 20).—Situated 6 miles S.E. from the Burra Burra Mine.

The principal work carried on at present is the erection, in No. 1 prospecting shaft, of a pumping plant, which consists of a 73/4 H.P. oil engine and deep well pump with 3in. pipes, capable of pumping 6,000galls. per hour.

At the 100ft. level in the S.W. crosscut, 28ft. in from the shaft, a large room has been made on the N.W. side of the crosscut, and the engine and pump placed in position.

At a point 10ft. S.W. from the plant a winze was recently started, 6ft. by 4ft. in the clear, and was sunk to a depth of 7ft., but the water came in rather heavily, and further sinking was discontinued for a time. Now that the pump is ready to work, and will pump the water direct to the surface, winze sinking in the formation has been resumed, and it is anticipated now, with pumping appliances, to be able to carry down the winze to a depth of 100ft. or more, so as to thoroughly test

the ore body at 200ft. from the surface prior to putting down a main working shaft. The N.W. drive in the lode at this level is in a total distance of 23ft., and the S.E. drive in a total distance of 90ft. from top of winze. The lode formation exposed in the drives and winze is well defined, and from 4ft. to 6ft. wide, containing nice seams and patches of high-grade copper ore. Two samples of the lode material in the winze gave on assay—one, 1'4 per cent. copper, and the other 9'3 per cent. copper. (10-9-14).

LOCALITY—YORKE PENINSULA.

THE HAMLEY COPPER MINE (*vide* Record, page 61, and Reviews 9, 10, 13, 14, 16, 18, and 19).

Work on this property is progressing very satisfactorily. The tributers have decided to continue working, and are now doing some new development work on the eastern portion of the blocks, as well as carrying on the usual mining work in the Karkarilla lode. The ore obtained from the latter will be stacked on surface until the war trouble is over. A site has been selected near the S. boundary of the Moonta property for a new shaft to intersect and work the York (or E. lode). Sinking is now in progress. The new shaft is 6ft. by 3ft. in the clear, strongly timbered with square sets and back laths, and is now down a total depth of 16ft.

Mining work is carried on at different levels in the Karkarilla lode. At the 50-fathom level in No. 1 shaft stoping work is in progress at the back of the drive, in the footwall portion of the formation, 4ft. wide, containing seams of fairly high-grade ore. N. of the shaft, and over the back of the 30-fathom drive, a large amount of stoping work is carried on for full width of formation, 6ft. to 8ft. wide, showing seams and patches of nice ore. A large quantity of lode material has been extracted from these workings. The last parcel treated by the plant on the mine yielded 35 tons of concentrates, which the manager anticipates will give 20 per cent. copper and 9 tons of slime, 8 per cent. copper. (12-8-14.)

LOCALITY—EYRE PENINSULA.

THE COWELL SILVER FIND (*vide* Reviews Nos. 17-20).—Situated in the hundred of Miltalie, about 18 miles from Franklin Harbor.

The main shaft on the property is now down a total depth of 101ft. from the surface. In the bottom a plat has been cut out E. for 6ft. in length, and off the plat a drive has been extended S. in good settled country for a distance of 15ft., and is now in progress.

At 25ft. and 50ft. levels drives have been extended for some distance N. and S. from the shaft. The country and formation in both these drives appear to have been greatly disturbed and faulted, and the vein material showing is chiefly ferruginous claystone of short length, and from 3in. to 4in. wide, containing patches of horn silver and copper ore.

At the 25ft. level, in the N.W. corner of the shaft, a vein, 3in. wide, of ferruginous material is exposed on the footwall, carrying horn silver and copper. A sample taken for full width of vein assayed 4'5 per cent. copper and 5,553ozs. of silver per ton.

The ore shoot showing in the various workings appears to have a slight angle to the S., and the work now in progress at the 101ft. level will have a fair chance of proving it in the settled zone. (18-7-14.)

A large amount of good systematic prospecting work has recently been done on different parts of the blocks, and at one point a vertical shaft has been sunk to a depth of 101ft. from the surface.

At different levels in the shaft a large amount of mining work has been done by driving, winze-sinking, and rising, and the large break in the country, which apparently dislocated the ore channel, is exposed in all the workings—from a point 19ft. N. of the shaft, just under the rich find, to a point 40ft. S. of the shaft at the

100ft. level—thus showing a fair angle of dip to the S., and the crushed casing material exposed on the wall (which in places contains small rich patches of silver ore) tends to show that a fair amount of displacement has occurred.

In the workings S., on the break at 25ft., 50ft., and 100ft. levels, the development so far is discouraging, as no defined ore channel has been disclosed. N. of the present workings, and under the break, there is a large belt of fairly-settled country not yet explored. This appears to me well worth testing, and now that the shaft is down, a crosscut extended W. at the 100ft. level would be good prospecting, and should determine if an ore channel traverses N. through this belt of country. (9-10-14.)

THE CALCOOKRA COPPER MINE (*vide* Reviews 12, 15, 18, and 19).—Situated in the hundred of Hawker, 18 miles from Franklin Harbor.

The outcrop of the lode formation traversing this property is not showing on the surface, being covered with from 1ft. to 3ft. of soil, so there was no possible chance on the surface to take a long sight with the compass to get the main bearing of the lode.

At one point on the line of strike two underlie shafts have been sunk to depths of 30ft. and 49ft. respectively, and for about 45ft. in all drives have been extended on the course of the lode, and a fair amount of stoping done. I examined all the accessible parts of these old workings, and took bearing and dip of the lode at different points in the mine, and found the average bearing to be N. 65° E., and the angle of dip S.E. 50° .

As shown on accompanying rough sketch, I selected sites for four bore holes. No. 1 bore is situated 206ft. from the outcrop, on the dip side of the formation, and will be put down on an angle of 20ft. in 100ft., and should intersect the lode material at 200ft. from the surface if it continues down at the present angle. Nos. 2, 3, and 4 sites were selected ready for boring, to intersect the lode at 300ft. These last three sites will depend to a great extent on what depth the lode is proved in No. 1 hole, and may require altering a little when that work is completed. (18-7-14.)

The diamond bore-hole on the property is down now a total depth of 350ft. The country passed through consists chiefly of schist, containing seams of white quartz and calcite. At a depth of 208ft. in the bore-hole a formation of spar and quartz, 5ft. wide, was intersected. As this formation is only 8ft. deeper than it was computed to cut the lode worked in the underlie, it is quite possible that it is the same ore channel, but of poor nature where passed through in the bore-hole.

The country rocks at various points on this property, and in the vicinity of the workings, show evidence of having been greatly disturbed and tilted, and in places dipping at varying angles in different directions, and most probably it has greatly affected the ore channel. Considering this, and the poor results in the first hole, it appears to me that it would be a good plan to try and test the lode at a shallower level, and for that purpose I selected a site for a hole at a point 132ft. from the outcrop, opposite the underlie, where the shoot of ore shows a length of 32ft. The hole will be put down at an angle of 30ft. in 100ft., and should intersect the lode at 100ft. from surface. (10-10-14.)

